

(No Model.)

2 Sheets—Sheet 1.

W. WEBSTER.

ATTACHMENT FOR FEED WATER HEATERS.

No. 537,326.

Patented Apr. 9, 1895.

Fig. 1.

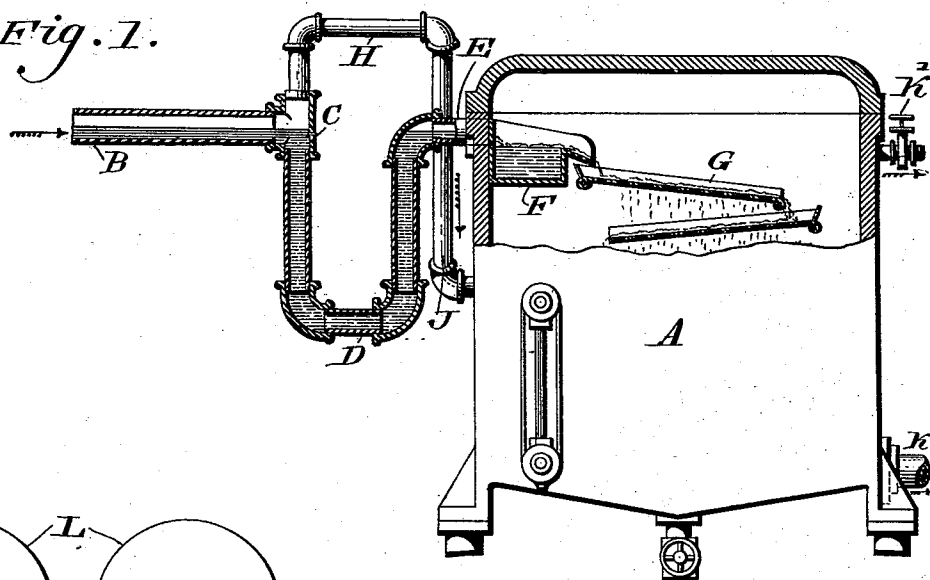
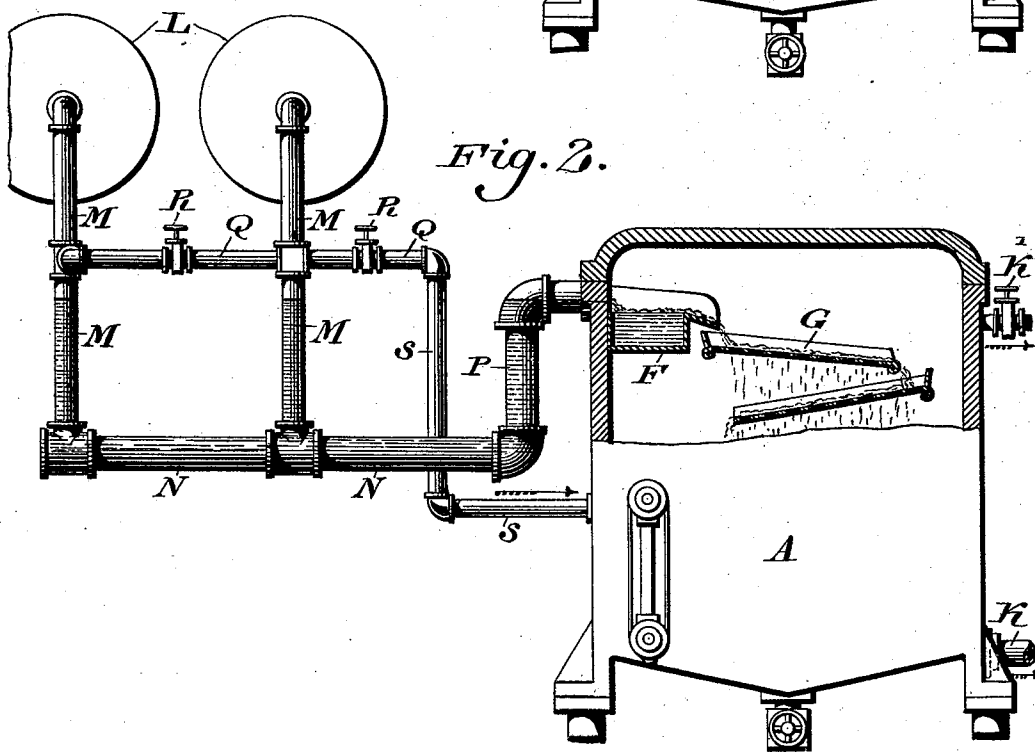


Fig. 2.



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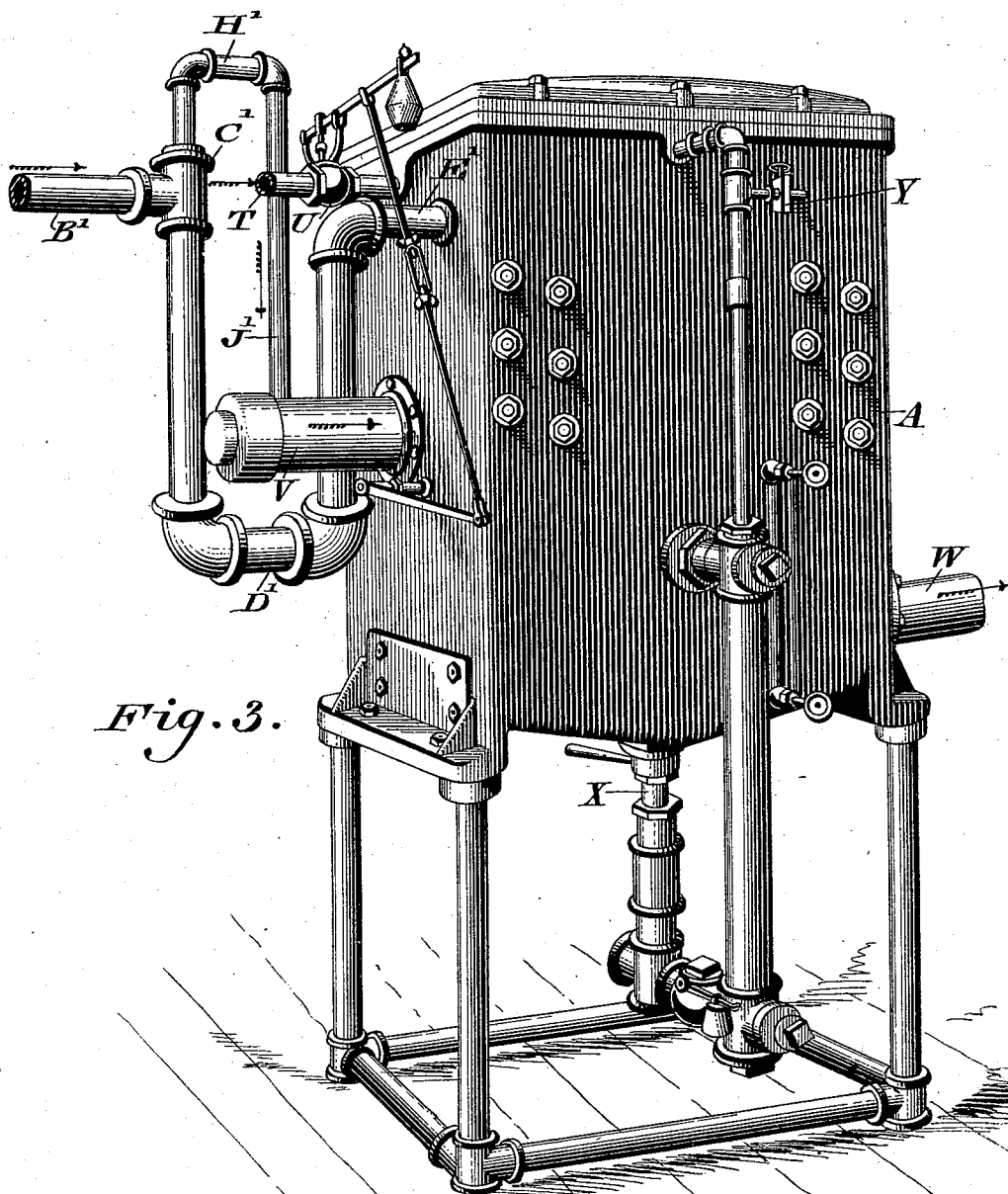


Fig. 3.

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UNITED STATES PATENT OFFICE.

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ATTACHMENT FOR FEED-WATER HEATERS.

SPECIFICATION forming part of Letters Patent No. 537,326, dated April 9, 1895.

Application filed January 19, 1895. Serial No. 535,490. (No model.)

To all whom it may concern:

Be it known that I, WARREN WEBSTER, a citizen of the United States, residing at Merchantville, in the county of Camden, State of New Jersey, have invented a new and useful Improvement in Attachments for Feed-Water Heaters, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to feed water heaters, &c., and consists of a novel attachment therefor, by means of which the hot air and vapors evolved from the return water of condensation of a steam heating system, paper drying cylinders, steam drums or any other form of steam apparatus, in which steam is employed as a heating medium, are conducted into the heater separately from the water, and then utilized to heat the latter provision being made for afterward withdrawing said hot air and gases, and also the water from the heater in any suitable manner, or by any of the means described in my former patents, No. 390,537, dated October 2, 1888; No. 390,538, dated October 2, 1888; No. 390,927, dated October 9, 1888; No. 396,971, dated January 29, 1889; No. 456,072, dated July 14, 1891, and No. 475,992, dated May 31, 1892.

It further consists of novel details of construction, all as will hereinafter be set forth.

Figure 1 represents a side elevation, partly in section, of an attachment for feed water heaters, &c., embodying my invention, and a portion of a feed water heater to which the same is applicable. Fig. 2 represents a side elevation, partly in section, of a similar feed water heater showing also, another adaptation of my invention thereto. Fig. 3 represents on an enlarged scale a perspective view of a feed water heater, showing more clearly the position of my attachment relative to the other parts.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings: A designates the casing of a feed water heater, which may be of any suitable construction, the structure of the same conforming preferably to that shown in prior patents granted to me in this same class of invention, although I do not desire to be limited thereto in every instance. The said heater is provided with a steam inlet, air outlet, feed water outlet and drain pipes of the usual construction, the features

of special novelty being the manner of introducing into the heater the return water of condensation, and the means for separating the hot air and gases therefrom, and afterward utilizing them to heat the water within the heater.

Referring especially to Fig. 1, B designates the hot water return or inlet pipe, the same being substantially horizontal in the present instance, and entering the fitting C to which is attached the U-shaped connection D, which serves as a water seal, the outlet E of which enters the heater on a lower level than said pipe B, and discharges into the box F, from which the water flows over the shelves G in the usual manner, it being apparent that the pipe E can enter the upper portion of the heater at any suitable point, and that the box F can be dispensed with, the water being sprayed into the heater in any suitable manner. It will also be obvious that any convenient form of trap may be substituted for the U-shaped connection D, the function being the same in every instance.

H designates a pipe leading from the upper portion of the fitting C, and having a depending branch J which communicates with the interior of the heater, and conducts the hot air and gases thereinto at any suitable point below the water, it being noted that the water level in the pipe B and the fitting C is such that the upper portion of the same is occupied by the hot air and gases evolved from said water or from other sources, said hot gases and vapors being conducted into the interior of the heater through the pipes J and H, and it will be understood that the latter may be connected directly to the pipe B if desired, instead of to the fitting C, or a tank may be substituted for said fitting C if desired.

The operation is as follows: The water of condensation from the steam apparatus, which may be a steam heating system, paper drying cylinders, steam drums or other similar apparatus in which steam is used as a heating or drying medium, is conducted to the pipe B, and thence through the U-shaped portion or water seal D to the box F within the heater, or to the upper portion of the latter, while the hot air and vapors are conducted from the surface of said water to the interior of the heater, below the water, said air and vapors passing upwardly through the water and the

heat abstracted therefrom, being imparted to said water and serving in conjunction with the steam injected therein to heat said feed water to a high degree, the latter being withdrawn by the pipe K, while the air can be removed from the interior of the heater by the valve K' or by any of the other means described in my former patents, the pipe carrying said valve K' being attached to the heater at any suitable point.

In Fig. 2 is shown another adaptation of my invention, L designating the cylinders of a paper drying machine of any suitable type, the water of condensation being conducted therefrom into the pipes M, each of which communicate with the pipe N, which latter it will be noted is below the level of the water box F with which said pipe N communicates, by means of the upright branch P, whereby it will be seen that the height of the water in the pipes M and P will always correspond to substantially the water level in the box F, and that the space above the water line in said pipes M, M, will be occupied by the hot air and vapors which are taken therefrom by means of the pipes Q, which have the valves R therein, said vapors being conveyed to the interior of the heater through the pipe S, which enters the same at such a point as to bring said hot vapors below the water to be heated, the operation being as has already been described, the pipes N and P serving to conduct the water to the upper portion of the heater, while the pipes Q and S convey the hot gases either unitedly or singly into the interior thereof, and it will thus be seen that all the heat units in said gases and vapors, are utilized effectively to heat the water entering the heater through the pipe P, the air and water being removed from the heater through the valve K' and pipe K respectively as before. It will also be noted that the discharge of the condensations from said cylinders L, will be accelerated, since the pipe for the hot gases is connected to the return pipes at a point above the water line, as is evident.

In the construction seen in Fig. 3, the connection is shown applied to a heater in addition to the ordinary appurtenances of the usual construction, T designating the usual water inlet controlled by the float actuated valve U; V, the steam inlet; W, the outlet to the pump, and X the drain pipe, and Y the air valve, &c., the auxiliary connections constituting the present invention being substantially the same as seen in Fig. 1, the parts B', C', D', E', H' and J' corresponding to the similarly arranged parts in said figure, the pipe J' however, entering the main steam inlet pipe V, while the water pipe E' enters the side of the casing at a point adjacent the main water pipe T. The operation will be as has already been described with reference to Fig. 1.

The main water and steam supply enter the pipes T and V respectively, while the hot water from other sources is introduced through the pipes B', D' and E', the latter

pipe entering the upper portion of the heater at any suitable point while the pipe J' conducts the hot vapors into the pipe V, provision being made for conducting the hot vapors and gases from any other source to said pipe V when desired, the air and water being removed from the interior of the heater by the air valve Y and the pipe W, respectively as is evident. It will thus be seen that in every instance, all the heat contained in the vapors and gases is effectually imparted to the water within the heater, a result which cannot be attained when the water and vapors are introduced into the heater in the same pipe in the usual manner, in which the vapors are above the water, since in the latter instance, no provision is made for bringing every portion of said water into direct contact with said vapors, which result can only be attained when the water is introduced into the upper portion of the heater in the form of a spray, or over distributing plates and the hot vapors enter the lower portion, both the water and vapors being brought into direct contact by the rising vapors meeting the falling water, which is the natural result, owing to the respective gravities of each, all the heat units in the vapors being thus imparted to the water, as is evident.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with a feed water heater, a return pipe or trap, a conduit leading from one portion thereof to said heater, for conveying the water of condensation to the latter, and another conduit leading from said pipe or trap to said heater for conveying the hot vapors evolved from said water of condensation to the latter.

2. A feed water heater, a return pipe or trap therefor, and separate conduits leading from said pipe or trap to the heater, at different levels, one of said conduits conveying the water of condensation to the heater, and the other conveying the hot gases evolved from said water also thereto, substantially as described.

3. A return pipe, a water seal device or trap attached thereto, and connected to a feed water heater, and a separate pipe for conducting the hot air or gases from said return pipe to the interior of said heater, substantially as described.

4. A feed water heater having the main steam and water inlet, the auxiliary water inlet provided with a water seal or trap, and a conduit for the hot vapors &c. leading from said auxiliary water inlet to the interior of the heater below said water inlet, whereby all the heat units of the hot vapors are effectively utilized, substantially as described.

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Witnesses:

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